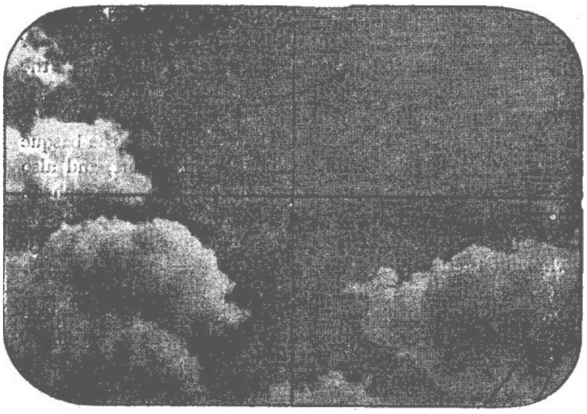
theodolite requires the two observers—each placed at one end of the measured base—to agree by telephonic correspondence on one fixed point in the cloud, which it is not always easy to do, as well as on the precise instant at which the observation should be taken; the calculation of the observations is subsequently made from trigonometrical formulæ, or by a slide-rule, or plotting machine. The photogrammeter, which is a theodolite provided with a small telescope and a camera obscura, possesses one great advantage from the fact that the two observers have no need to agree as to the special point to be observed; it is sufficient that both photograph the same part of the sky at the same moment. On each photographic plate the coordinates of a point of intersection are known, and by placing it upon a glass scale graduated to millimetres the coordinates of as many points as may be desired can be fixed; it is only necessary to determine, once for all, how many minutes correspond to a millimetre on the plate. Once the coordinates are found, the calculations can be made as in the case of the theodolites. As these researches require the calculation of a great number of observations, it is indispensable that the methods employed in reducing them should be as simple as possible. This desideratum has been solved by M. Åkerblom, in a very satisfactory manner, in a pamphlet entitled "De l'emploi des Photogrammeters" (Upsala, 1894), which has been distributed by Dr. Hildebrandsson to intending observers. Easy methods of reduction, giving approximately correct results, have also been devised by General R. Strachey and Sir G. Stokes.



We have before us a valuable investigation by Dr. Kayser, containing some 1500 cloud measurements made under the auspices of the Philosophical Society of Danzig, between May and August 1895, by means of photogrammeters. In various respects the camera used appears to be an improvement on some of the instruments hitherto adopted, being of simple construction, well balanced, and combining ease of movement with necessary rigidity, while the altitude and azimuth circles are sufficiently large to admit of accurate reading. The accompanying plates are reproductions of a pair of photographs of a cumulus cloud observed by this means on May 25, 1895. The mean height of the cloud from several measurements was found to be 1714 metres, the distance between the two observing stations being about 679 metres. In order not to delay the publication of the Society's volume, no classification of the heights of the various clouds has been made; but in the *Meteorologische Zeitschrift* for May, Dr. Sprung has attempted this, and finds the mean values in metres to be as follows:—Stratus, 1704; cumulus, 2856; strato-cumulus, 2196; alto-cumulus, 4098; cirro-cumulus, 6834; cirrus, 10,043. The daily variation of altitude cannot be deduced from these observations, because they were not distributed sufficiently uniformly throughout the day. Dr. Kayser's work contains useful materials for the study of observers during the international cloud year, and we are glad to see that the observations are to be continued this summer.

NOTES.

ON Wednesday in last week, the Queen invested Lord Kelvin with the Riband and Badge of a Knight Grand Cross of the new Royal Victorian Order.

SIR WILLIAM MACCORMAC has been elected President of the Royal College of Surgeons of England.

GENERAL M. RYKATCHEF has been appointed Director of the Central Physical Observatory, St. Petersburg, in the place of Dr. H. Wild, resigned. For many years General Rykatchef has had charge of the maritime meteorological branch of that Observatory.

IN the House of Commons on Friday last, Sir S. Northcote asked the President of the Board of Trade if he would introduce this Session a Bill to deal with the metric system, in order that chambers of commerce and other parties interested might have sufficient time during the recess to consider the proposals of Her Majesty's Government on this subject. Mr. Ritchie replied that he would be glad to introduce the Bill, but without any intention of proceeding with it this Session.

THE large male Indian elephant which was brought home by the Prince of Wales from India in May 1876, and which died in the Zoological Society's Gardens on March 8 last, has been successfully mounted by Mr. E. Gerrard, jun. The specimen is at present placed in the Central Hall of the Natural History Museum, just opposite the principal entrance; but it will be ultimately moved to the Mammal Gallery, which is now in process of rearrangement, when space has been found for it.

A FINE example of the Pangolin, or Scaly Anteater, is now on view at the Zoological Society's Gardens, having been placed there, on deposit, by the Hon. Walter Rothschild. Pangolins are seldom seen in captivity, being very difficult to keep in good health. There has been no example of this form in the Society's collection for nearly twenty years. The present specimen, which seems likely to do well, belongs to the species called the Short-tailed Pangolin (*Manis temmincki*), of which a good figure is given in the third volume of "The Royal Natural History," lately published. It is said to have been obtained in the Transvaal.

DR. KLEIN recently delivered three lectures on the subject of "Recent Researches in the Identification of the Typhoid Bacillus and the Cholera Vibrio," being the Harben Lectures in connection with the British Institute of Public Health. The lectures are the property of that Institute, and will be published in its official organ, *The Journal of State Medicine*. The first lecture has just been published in the July number. The other lectures will appear in the August number.

BY means of a rearrangement of existing scholarships at the Charing Cross Hospital Medical School, and by the establishment of a special fund, memorials have been founded to Dr. Livingstone and Prof. Huxley, both old students of the school. The memorial to Livingstone takes the form of an entrance scholarship of 100 guineas per annum, and that to Huxley of (1) an entrance scholarship of £55, open to the sons of medical men; (2) a second year's prize in anatomy and physiology; and (3) a lectureship dealing with recent advances in science and their bearing on medicine and surgery. The first of these Huxley lectures will be delivered in the anatomical theatre of the Medical School on Monday, October 5, by Dr. Michael Foster.

THE Bertillon system of anthropological measurements has just been adopted at the Sing Sing States Prison.

THE 126th meeting of the Yorkshire Naturalists' Union will be held at Staithes, for the investigation of the neighbouring coast, and the Easington and Roxby Woods, on Bank Holiday Monday, August 3, 1896.

THE annual meeting of the Society of Chemical Industry was held as we went to press last week. In the course of his presidential address, Mr. Thomas Tyrer compared the German and English chemical industries, and remarked: "The real cause of the progress and prosperity of the former is to be found in the superior qualifications of the directing minds. Germany does not owe her progress alone to protective tariffs, nor to the superior discipline of her workmen, but to her thorough system of education, elementary and secondary. Dr. Seth Low's definition of a college as a place for liberal culture and a university as a place for specialisation based on liberal culture, is true of Germany, and should be so for Britain. The agitation for a teaching university for London is, therefore, a good thing. Moreover, no scheme of education will approach perfection unless it provides for the graduated affiliation of schools and colleges with universities. The City Companies and Guilds of London are taking a prominent part in supplying the great need for scientific training; and with all the resources of this wealthy country, the practicality of its people, and the public spirit of its citizens, we ought to remain very little longer in a state of educational backwardness. It is but necessary that the State shall define the need, and the steps by which that need shall be met, and then resolutely carry them out." The Council recently instituted medals to be awarded at intervals of not less than two years for conspicuous services rendered to applied chemistry by research, discovery, invention, or improvement in processes. The first award was made, at last week's meeting, to Mr. John Glover, inventor of the "Glover" tower, the introduction of which marks an important development in alkali manufacture. The newly-elected President of the Society is Dr. Edward Schunck, F.R.S.

THE naturalists of the Marine Biological Association have recently been paying particular attention to the question of the collection of fishery statistics, and an important report on the subject has just been received by the Council of the Association. In this report an account is first given of the statistics at present collected and published by the Board of Trade relating to sea-fisheries in England. It is pointed out that the methods at present adopted for collecting the statistics are not such as to give confidence in the accuracy of the returns, whilst their inadequacy in plan and extent cannot be questioned. The defects upon which emphasis is principally laid are the want of sufficient discrimination between the species of fish landed, the lack of all information as to the locality of capture of the fish, and the fact that no attempt is made to distinguish between the products of different methods of fishing. Various suggestions are made as to the methods by which the statistics could be improved, and it is maintained that the only really satisfactory course would be to require the master of each fishing vessel to supply the Board of Trade with correct returns of the fish caught, and of the locality of their capture. In the case of the larger vessels, at any rate, such records already exist, and are supplied by the master to his owners. All that is required is that copies of these records should be furnished to the proper officers, so that the information may be utilised for the general benefit of the public and of the fishing industry. The report will be published, in full, in the forthcoming number of the *Journal* of the Association.

AS previously announced, the autumn meeting of the Iron and Steel Institute will be held at Bilbao on September 1-4. The Local Reception Committee, which comprises all the various local authorities, corporations, ironmasters and miners, with Don Julio de Lazurtegui as honorary secretary, has now drawn up an outline programme of the meeting. The Orient Company's s.s. *Ormuz*, which has been detailed to convey the members to Spain, and to serve as a "floating hotel," will leave Tilbury for Portugalete at noon on Saturday, August 29. On the arrival of the *Ormuz* at Portugalete, the Reception Committee will go out to meet the steamer, and will welcome the visitors. Immediately after this visit the members will visit the new harbour and breakwater now in course of construction, and continue up the river Nervion to Bilbao, inspecting on their way the electric installation of MM. Coiseau Couvreux et Félix Allard, for making the mammoth concrete blocks used in the construction of the breakwater. On Tuesday, September 1, the members will formally visit Bilbao, where they will be welcomed by the Alcalde in the *Salon de Actos* of the Provincial College. The general meeting for the reading and discussion of papers will then be held. In the afternoon the members will visit the steel works of the Sociedad de Altos Hornos; and in the evening, there will be a reception by the Alcalde in the new Municipal Buildings. On Wednesday, September 2, after the general meeting and luncheon, the members will visit the steel works and coke ovens of the Sociedad La Vizcaya, and afterwards the tin-plate works of the Sociedad La Yberia. In the evening, there will be a grand tennis match (the basque ball game of *Pelota*) in the Euskalduna Tennis Court, and also a *fête champêtre* and concert, at which the Bilbao Orpheon of 100 members have consented to sing, in the Campos Eliseos. There will be no general meeting on Thursday, September 3, the whole of the morning being devoted to visiting the mines. The *Ormuz* will leave Portugalete on the following day for Santander, where the mines will be visited. Short stays will be made at San Sebastian and St. Jean de Lux on the way back to London, which will be reached on Saturday, September 12.

THE sixty-fourth annual meeting of the British Medical Association will be held at Carlisle, on July 28-31. The President-elect is Dr. Henry Barnes. An address in medicine will be delivered by Sir Dyce Duckworth, and one in surgery by Dr. R. Maclaren. The scientific business of the meeting will be conducted in nine Sections. The President of Section A (Medicine) is Dr. George F. Duffey; and among the subjects down for discussion are: the treatment of cardiac failure, with special reference to the methods of passive exercise, active exercise and baths; anæmia, its varieties, causation, associated pathology, and treatment; tuberculosis, its prevention and cure. In Section B (Surgery), presided over by Dr. A. Ogston, Dr. Macintyre will demonstrate the use of Röntgen rays in surgery, with special reference to the cavities of the body, instantaneous photographs, and fluorescent screens. Section C is devoted to obstetrics and gynæcology; the President is Dr. J. H. Croom. Sir Joseph Ewart, President of Section D (Public Medicine), will open the Section with an address. Among the subjects to be brought forward are: Medical research in relation to hygiene, vaccination and revaccination with animal vaccine in Germany, and diphtheria in town and country. Section E (Psychology) will be opened by the President, Dr. J. A. Campbell, with an address. Most of the papers down for reading and discussion in this Section belong to pathological psychology. An introductory address will be delivered to Section F (Pathology and Bacteriology) by the President, Dr.

Sheridan Delépine; and there will be a discussion on the relation of the morbid conditions dependent on (or associated with) the presence of streptococci. Dr. David Little will preside over Section G (Ophthalmology), Dr. J. Finlayson over Section H (Diseases of Children), and Dr. T. F. I'Anson over Section I (Medical Ethics). A number of garden parties and other social functions have been arranged, and these will help to lighten the large amount of work which the various Sections will have to do.

It was shown by M. H. Moissan, about three years ago, that when iron was saturated at 3000° C. with carbon, and then cooled under a high pressure, a portion of the carbon separated out in the form of diamond. It occurred to M. Rossel (*Comptes rendus*, July 13), that the conditions under which very hard steels are now made, should also result in the formation of diamonds; and an examination of a large number of samples of such steel has shown that this is really the case. The diamonds are obtained by dissolving the metal in acid, and then subjecting the residue to the action of concentrated nitric acid, fused potassium chlorate, hydrofluoric and sulphuric acids successively. The crystals are very minute (about 15 μμ), the largest attaining only 0·5 mm. in diameter, but they present all the chemical and physical properties of true diamonds.

The detection and estimation of small amounts of marsh gas in air is a problem of considerable practical importance in the ventilation of mines, and numerous instruments having this object have been designed. In the May number of the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*, Mr. E. Hardy describes a new apparatus for this purpose which presents many novel features. The principle utilised is the variation of the velocity of sound in a gas with its density. The air under examination is forced through a small organ pipe, and the note thus produced compared with that given out by a second pipe fed under parallel conditions with pure air, the number of beats per second produced giving a measure of the methane present, the apparatus being so arranged that the moisture, carbonic acid, and possible variations of temperature exert no influence on the result. Three types of instrument are constructed, portable, fixed, and self-recording. In the second type a telephone from any convenient place is put in connection with two microphones placed on the organ pipes, so that by simply counting the number of beats, the manager can instantly recognise from his office the presence of fire-damp in the part of the mine from which the air is being drawn, 1 per cent. of methane giving about three beats per second. The only drawback to this ingenious apparatus is that it is rather complicated in detail, and therefore costly, especially in the self-recording type; but the advantages of extreme simplicity in actual use, combined with the convenience attaching to the telephone, will doubtless outweigh this in practice.

In a paper on gall-making coccids, contributed by Mr. C. Fuller to the *Agricultural Gazette* of New South Wales (vii. 4), some details are given concerning the genus Brachyscelis, the members of which live exclusively upon species of Eucalyptus, causing the growth of woody galls, in the heart of which they dwell. These coccids are popularly known in Australia as "gall-makers," but the gall-growth differs from the "meal" of the mealy-bug and the "scale" of the bark-louse—which are other Australian species of Coccidæ—in that it is brought into existence at the actual and direct expense of the tissue of the plants, whilst the meal and the scales are products secreted or excreted from the bodies of the insects themselves. The larvæ of all Brachysceles are so similar in appearance as to afford no sufficient characteristics for the determination of species. The male galls take the form of short cylindrical tubes, not exceeding six lines in length, and generally growing upon the leaves. The female galls exhibit a great variety of forms, which supply the easiest means of distinguishing the different species, and which vary in length from half an inch to six or seven inches. Some resemble cones, others nuts and fruits, whilst the latera growths, due to *B. duplex*, are not unlike leaves. Occasionally supported on stalks, they are more often sessile upon the branches, twigs, or leaves from which they spring. These abnormal members of an aberrant group like the Coccidæ should repay further study.

Do varieties of peas run out? This problem is dealt with in *Bulletin* No. 131 of the Michigan Agricultural Experiment Station, and the answer is that varieties at least lose their original characteristics. Such "running out," however, does not necessarily imply deterioration, as sometimes it is merely a changing of characters. Accurate descriptions accompanied by drawings are kept of varieties of peas grown at the station. These serve to show that varieties change from year to year—even the old standard sorts, the characters of which are supposed to be firmly fixed. The foliage and habit of the plants are found to be less variable than the peas themselves, which are generally the object of selection. The variety Stratagem was grown from seed obtained from three different dealers. In all, the characteristic dark green foliage, stalky, angular veins, and exceedingly short nodes of the variety named were apparent. But the pods, though irregular and varying in each sample, yet, taken as a whole, were distinctly different. In two of the samples the pods were fairly uniform, but in the third they were so irregular—probably reversions to one of the parents—that the peas were almost worthless. It is a matter of common observation that seed peas of the same variety, especially the wrinkled sorts, differ in colour as supplied by different seedsmen. In several cases peas grown on the station grounds have changed the colour of their seed within the last four years.

A brief statement of the facts as to the anti-cholera serum experiments carried out by Prof. Kitasato, of Tōkyō, is made by Dr. A. Nakagawa in the current number of the *British Medical Journal*. Preliminary experiments in the laboratory for ascertaining the curative action of the serum were carried on in this wise: A number of guinea-pigs were inoculated with several times the fatal dose of the virus, so that the untreated animals died within twenty hours after such inoculation. At the expiration of each successive hour injections were made in some of the animals, and it was shown that those treated not later than seven hours after the inoculation of the virus were cured, while those in which the injections were made after the lapse of seven hours could not be saved by the serum. In other words, if injected during the first third of the entire course of the disease (thus experimentally produced) the serum can be considered curative. Cases of cholera were afterwards treated with anti-cholera serum at the Hiroo Hospital, Tōkyō. Of 270 cases admitted, 138 died, which gives a rate of mortality of 51·1 per cent. Anti-cholera serum was employed in 193 cases only, owing to the fact that the supply of serum was inadequate to allow it to be used in all cases. The rate of mortality among Japanese in nearly all the previous epidemics, as well as that of the last epidemic, has always been about 70 per cent. Without claiming to draw, from a number relatively so small, the final conclusion that the serum treatment was attended with the reduction of 20 per cent. in the mortality statistics, it is evident at least that the result of the new therapy was not an unfavourable one. Moreover, Dr. Nakagawa thinks there is reason to believe that, with a sufficient supply of very efficient serum, the rate of mortality can still be lowered.

Students of Japanese culture will be interested in a paper on "Anatomy and Æsthetics among the Japanese," in *Globus*

(Band lxx. p. 21), by Max Buchner, and in the folk-lore contained in P. Ehmann's paper on "Popular Notions in Japan," in the current volume of *Œsterreich. Monatsschr. für den Orient*, p. 58.

DR. F. SOSSET has published in the *Revue de l' Université de Bruxelles* (vol. i. p. 481) a painstaking account of weaving in Ancient Greece, and has employed various representations from Greek vases and other sources to illustrate the accounts given by the classical writers. Those who are interested in the development of the industrial arts should consult his memoir.

THE contemporaneity of Man with the Gigantic Fossil Sloth Megalonyx appears to be now established, Mr. H. C. Mercer having recently obtained distinct evidence on this point in the Big Bone Cave, Van Buren County, Tennessee. The full report, which will be published by the Archæological Department of the University of Pennsylvania, will be awaited with interest, as it should provide data towards the solution of the problem of the length of time man has existed in the New World.

THE British Museum possesses several very beautiful and valuable examples of Ancient Mexican mosaic work. These, together with examples in other European museums, have been figured and described by Mr. A. Oppel in *Globus* (Band lxx. p. 4). The most important material of these mosaics is turquoise; in none is it wanting, and on one shield in Vienna it is the only stone employed, tesseræ of shell (white, light red, and purple-red), nacre, malachite, gold, obsidian, and other materials are also employed. The masks, head-dresses, shields, and other objects which were decorated in this sumptuous manner, were evidently employed in the ancient religious ceremonies.

UNDER the title of "Common Sense in Chess," an abstract of twelve lectures delivered by Mr. Lasker in London last year, has been published by Messrs. Bellairs and Co. As an exposition of the methods of this brilliant player, this pamphlet will be read with much interest, more especially since, instead of the exhaustive variations of the openings customary in works of this class, an attempt is made to base the conduct of the game upon a few simple general principles. These principles are advanced in the opening chapter as empirical rules, to which the games worked out in the subsequent chapters supply the proof.

WE are glad to be able to report a considerable step in advance made by the Observatory at Athens by the publication, from the 4th ult., of a daily weather report containing twenty-five stations in Greece, and about double that number of exterior stations. The report is accompanied by two charts, one showing the isobars and general meteorological conditions at 8 a.m. over a large part of Europe, and one showing wind and temperature over Greece and adjacent islands. Observations have been made regularly at the Athens Observatory since 1858, some of which have been published and discussed; but we are not aware that the issue of synchronous charts, in the form adopted by other countries, has been before attempted.

THE additions to the Zoological Society's Gardens during the past week include a Squirrel Monkey (*Chrysothrix sciurea*) from Guiana, presented by Mrs. Turner-Turner; a Huanaco (*Lama huanacos*, ♂) from Bolivia, presented by Mr. J. F. Schwann; a Passerine Owl (*Glaucidium passerinum*), European, presented by Miss Bloxam; four Rough-keeled Snakes (*Dasypeltis scabra*), a Lineated Boodon (*Boodon lineatus*), a Rhomb-marked Snake (*Psammophylax rhombeatus*), a Delaland's Lizard (*Nucras delalandii*) from South Africa, presented by Mr. Frederick A. Story; an Agile Wallaby (*Halmaturus agilis*, ♀) from Australia, an Indian Python (*Python molurus*) from India, seven Peruvian Snakes (*Tachymenis peruviana*), nine —— Lizards (*Liolæmus* sp. inc.), five Gay's Frogs (*Calyplocephalus gayi*), six Bibron's Frogs (*Paludicola bibroni*) from Chili, deposited; a Brazza's Monkey (*Cercopithecus brazzæ*, ♀) from French Congoland, a Tayra (*Galictis barbara*) from South America, a Patagonian Conure (*Conurus patagonus*) from La Plata, purchased.

IN our report of the celebration of the Kelvin jubilee, on p. 177 of our issue of June 25, Prof. Cleveland Abbe was inadvertently credited with being the "head of the Meteorological Office, Washington." To prevent misapprehension, it may be desirable to state that the responsible position of Chief of the U.S. Weather Bureau is actually filled by Prof. Willis L. Moore.

OUR ASTRONOMICAL COLUMN.

DOUBLE STAR ORBITS.—In the *Astronomical Journal*, No. 378, Dr. See gives the complete list of the various double star orbits that he has computed and published in various journals. This is a useful compilation, and testifies to a considerable amount of industry, and exhibits his great interest in the subject. The "probable uncertainty" which he has attached to some of the elements is, however, very different from "the probable error," which is an arithmetical result, and has a definite meaning. The "limits of uncertainty" attached to the period and excentricity, give Dr. See's estimate of the degree of success with which he has handled incorrect and inadequate measures. Almost simultaneously with the appearance of Dr. See's paper comes, in *Ast. Nach.*, No. 3364, Dr. Doberck's results of his investigation of the orbit of γ Virginis, and it is scarcely necessary to remark, that he has had under review precisely the same observations that Dr. See has used. If Dr. Doberck is able to add one or two more recent observations, they have been made at a time when the companion is near aphelion, and have little influence on the orbit. Nevertheless, the period and excentricity differ more from the values that Dr. See has obtained than his assigned values of uncertainty. If, then, the treatment of the same observations, by experts in this class of computation, lead to sensibly different orbits, it is to be feared that new material, arising from the continued observation of stars that have been much less frequently measured than γ Virginis, will lead to still wider discrepancies.

ROTATION PERIOD OF JUPITER.—The movements of the various spots, &c., on the surface of Jupiter have been employed since the time of Schrœter (1787) for observing the period of rotation of the planet. During the last opposition two very marked spots have been specially persistent, and by means of one of them, the "Garnet" spot, Prof. A. A. Rambaut has made a new determination of the period (*Scien. Proc. Roy. Dublin Soc.*, vol. viii. p. 389). All the values hitherto found have demonstrated that the various parts of the surface rotate at different speeds, so this new value simply refers to the zone in which the spot is situated. This is the one having a zenographical latitude of + 13°, the previously accepted period of which was 9h. 55m. 33·9s. The time was measured by taking the intervals between the transits of the spot over the fixed wire of the micrometer on the "South" equatorial. The time of central transit was taken as the mean of the preceding contact, bisection, and following contact of the spot. Corrections were applied for three sources of error which affect the result, viz.: (1) *Parallax*, (2) *velocity of light*, (3) *phase*. The final value of the rotation of this spot is 9h. 55m. 33·36 ± 0·53s., which agrees within one-fifth of a second with Schrœter's value.

TELLURIC LINES.—Prof. Ricco has been investigating the relative behaviour of the chief atmospheric lines of the solar spectrum under various observing conditions (*Mem. del Soc. Spettroscopisti Italiani*, vol. xxv. pp. 127-134, 1896). The lines particularly under discussion were 6868 (β), 6517, 6278 (α), 5943 (rainband), and 5800 (δ). Observing the spectrum with a direct vision spectroscope, the relative intensities of these lines were measured in three districts, Etna, Nicolosi, and Catania, with the sun at varying altitudes at each station. From the measured altitudes, the thickness of the absorbing stratum of air traversed was calculated for each observation. The tension of the aqueous vapour in the air was also recorded at the time each line was measured. On plotting the results graphically, and summing up the measures at each station, the general con-